First International Conference on Global Food Security
29 September – 2 October 2013 . Noordwijkerout –The Netherlands

Food security in West Africa: The contribution of Remote Sensing to the analysis of crop production dynamics

Leroux L[1], Zoungrana B[2], Bégué A[1], Baron C[1], Lo Seen D[1]

1: CIRAD, UMR TETIS Montpellier, France louise.leroux@teledetection.fr
2: Centre Régional Agrhymet Niamey, Niger

Context

In a context of growing population pressure and climate variability, West African countries are highly vulnerable to food insecurity. A solid understanding of agricultural production is necessary in order to:

- Ensure food security, prevent crisis and ensure a stable and reliable access to food,
- Help in decision making for public policies related to the development of agricultural production.

Observations

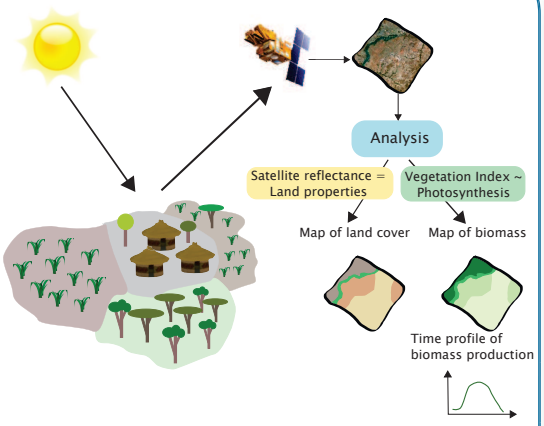
- Studies carried out on crop production in West Africa are mainly based on ***data that are quantitatively and qualitatively limited*** because of the weak means of data collection, storage and distribution of agricultural and food statistics.
- Remote sensing provides ***repetitive, global and objective data*** and allows a spatio-temporal monitoring of crop production.

Objectives

A joint analysis of remote sensing and statistics data in order to demonstrate ***how remote sensing information can help to analyze food security in West Africa*** by performing:

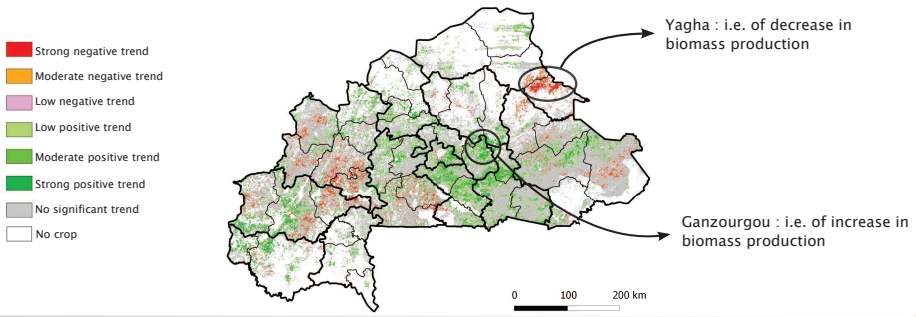
- A trend analysis of biomass production (remote sensing) and agricultural production (statistics),
- The identification of extreme events through these different data sets.

The Remote Sensing Approach



Can the spatio-temporal variability of land cover and biomass production be revealed using Remote Sensing? Case of Burkina Faso

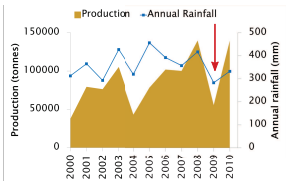
Trend of crop production in Burkina Faso within cropland (2001-2011 ; MODIS data)



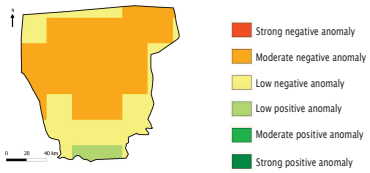
>>> Remote sensing allows the identification of cropland, and the mapping of biomass production and its dynamics at a country scale

Can crop production extreme events be captured with Remote Sensing? Case of Ouallam (Niger)

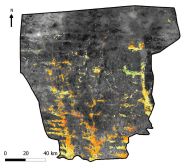
Evolution of agricultural production (Agrhymet data) and rainfall



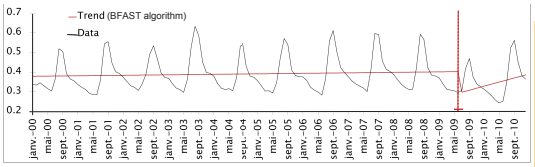
Rainfall anomalies in 2009 (TRMM data)



Crop vegetation anomalies in 2009 (MODIS data)



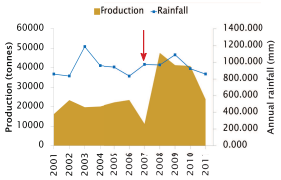
Monthly vegetation index time series within cropland



>>> For 2009, annual rainfall, statistics and remote sensing data are in agreement
>>> Time series analysis of remote sensing data allows the detection of crop production breakpoints due to rainfall variability

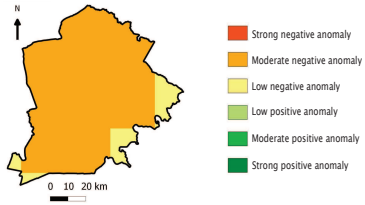
Can anomalies of crop production be explained with Remote Sensing? Case of Kompienga (Burkina Faso)

Evolution of agricultural production (Agrhymet data) and rainfall

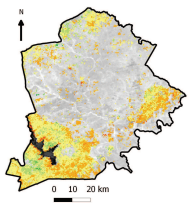


- A drop in crop production in 2007
- A year of above-average rainfall

Rainfall anomalies in October 2007 (TRMM data)

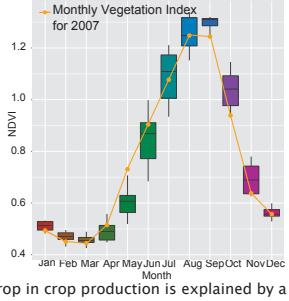


Crop vegetation anomalies in November 2007 (MODIS data)



Intra-annual variability analysis

Vegetation index intra-annual variability within cropland (2001-2011 ; MODIS data)



- Drop in crop production is explained by a drop in vegetation production during the time of grain filling (September – October)

>>> Because of a finer temporal resolution, remote sensing helps to understand drops in agricultural production and to identify areas with a high production deficit

Conclusion

- An good overall agreement between statistics and remote sensing data
- Remote Sensing derived information contributes to improve our understanding of agricultural production dynamics
- Need of external reference data sets to confirm our results